Method and arrangement for calculating the user charge in a subscriber device

In order to calculate the user charge in a subscriber device which is connected to a telecommunications network and which contains a control unit (ST) and a storage device (SP) and to which charge data (P) is transmitted from a switching sub-system (SSS), tariff data (Z) allocated to the subscriber and the charge data (P) transmitted from the switching sub-system (SSS) is stored in the storage device (SP). The control unit (ST) calculates the user charge from tariff data (Z) which can be read out from the storage device (SP) using the dialled number of a remote subscriber and from corresponding charge data (P).

Description

The invention relates to a method for calculating the user charge in a subscriber device according to the preamble to claim 1. The invention furthermore relates to an arrangement for carrying out the method.

It is already generally known for the relevant user charge to be displayed on subscriber terminal devices which are connected to a telecommunications network or to the public mobile radio network. Meter pulses, by means of which the relevant user charge is calculated, for example for a call, are transmitted in the public telephone network for this purpose. The calculated user charge is then displayed on a display unit of the subscriber terminal device. In this way, the user can obtain information on the costs incurred in using the subscriber terminal device, a standing charge of course normally being added to the user charges.

If a telecommunications service is provided by a service provider, the latter may implement a different tariff structure independently of the charge data provided in the network.

An example of a telecommunications network is the mobile radio network known by the name of GSM (Global System of Mobile Communication). In this mobile radio network, a service feature known by the name of "Advice of Charge" is used to calculate charges. An "e-parameter set" is transmitted from the switching sub-system depending on parameters such as the number of a dialled remote subscriber, the type of service and the category, in this case to the mobile station. Using this e-parameter set, the mobile station calculates the user charges incurred. Information such as the charge interval, the units per interval and a conversion factor are stored in this e-parameter set.

If a service provider offers different tariff models to subscribers, the mobile station, using the e-parameter set, is not currently able to calculate the user charges actually incurred. Tariff models of this type are, for example, a high standing charge and low user charges per call or a low standing charge and a high user charge per call. The first tariff model is used in particular if the number of calls is very high, whereas the second tariff model is suitable, for example, for private customers who make relatively few telephone calls.

It would be conceivable to take account of the special tariff models of the individual mobile radio customers in the switching sub-systems of the mobile radio network. However, this incurs a very high technical cost. For example, more than 100 different tariff models are currently offered in Germany. The "Advice of Charge" feature therefore indicates the user

charges actually incurred for only a small number of customers. The mobile stations offer the facility for charge calculation depending on the duration of a call by means of a fixed factor, but this facility is extremely inaccurate, since it does not make a distinction between normal and reduced tariffs or between national and international calls.

The object of the invention is therefore to indicate a method and an arrangement by means of which the user charges actually incurred can be displayed in a subscriber terminal device.

According to the invention, the object is achieved with the method of the aforementioned type by means of the features indicated in claim 1. An arrangement and a terminal device to carry out the method are indicated in claims 15 and 16. Further developments of the invention are shown in the subclaims.

The method according to the invention offers the advantage that user charges can now be calculated using a subscriber-specific charge model, and therefore the subscriber is informed immediately of the user charges actually incurred, which has hitherto not been possible. The subscriber-specific charge models can be stored in particular on a chip card, so that the calculation is independent of the subscriber device.

The method and the arrangement, and the terminal device according to the invention are explained in detail below with reference to drawings, in which:

FIG 1   shows a block diagram of a known mobile radio system

FIG 2   shows a schematic representation of the transmission of charge data to a subscriber device

FIG 3   shows a block diagram of an arrangement to carry out the method

FIG 4   shows a schematic representation of zone data and charge data which can be read out from memories

The telecommunications network shown in FIG 1 is designed as a mobile radio network known by the name of GSM (Global System of Mobile Communication) on the basis of an electronic switching system. It contains a plurality of system units, i.e. a switching system SSS, a radio system RSS and an operation and maintenance system OMS. The switching system SSS establishes the connection between the radio system RSS and a public telephone network PSTN, for example an ISDN network, or with a different mobile network PLMN. The radio system RSS is divided up into base stations BSS and a plurality of mobile stations MS which serve as subscriber devices. The base stations BSS provide all the functions which are required in order to ensure radio coverage of cells, and the mobile stations MS provide all functions for the subscriber. Each base station BSS comprises a base station controller BSC, which performs all radio transmission functions, local processes and maintenance functions, and one or more base transceiver stations BTS. A system of this type is described, for example, in a brochure entitled D900 Mobile Communication System SYD from Siemens AG.

Along with a mobile switching centre MSC, the switching system SSS contains a home location register HLR connected to the former, a visitor location register VLR and an

equipment identification register EIR. The visitor location register VLR stores information on the mobile stations MS which are currently located in the relevant visitor location register area and the home location register HLR stores all the data relating to the mobile station MS, which is forwarded if necessary to a visitor location register VLR.

Due to the mobility of the mobile radio subscriber, the mobile radio network PLMN must always be informed of the current location of a mobile radio subscriber. The visitor location register VLR contains all information on the mobile radio subscribers currently located in the visitor location register area which it monitors. In order to provide this information, the mobile radio network PLMN must always have the latest information on the location of any mobile radio subscriber or the mobile station MS.

In the known mobile radio system, it is customary to transmit an "e-parameter set" to a mobile station in order to calculate and display the user charge there. This e-parameter set, as shown in FIG 2, is generated in the switching system SSS in whose visitor location register VLR the mobile station MS has registered itself. The e-parameter set is dependent on the dialled telephone number of a remote subscriber, the service features and time parameters, for example the time of day or the day of the week. The service features indicate, for example, whether the speech is coded at the full or only the half data rate. Using the e-parameter set transmitted to the mobile station MS, the mobile station MS calculates the charges incurred. Information such as charge intervals, units per interval and conversion factors are stored in this e-parameter set.

Since service providers which offer subscribers specific services in collaboration with the network operator are connected between the operator of the mobile radio network and the subscriber, and since the service providers offer subscribers different tariff models, it is not currently possible to calculate and display the actual user charges in the mobile station MS using the e-parameter set.

In the mobile station shown in FIG 3, a central control unit ST is provided to which a loudspeaker H, a microphone M, a keypad T, a display unit A, a card reader KL and a transceiver unit SE connected to an antenna AN are connected. The card reader KL has a live connection to the removable chip card SIM which, in addition to the units customary in mobile stations, contains a storage device SP. The storage device SP has two storage areas S1 and S2. Tariff data, which selects a zone of the tariff model using a dialled telephone number of a remote subscriber and, if necessary, using location data, is stored in the first storage area S1. A general tariff model corresponding to the e-parameter set is stored in the second storage area S2. Tariff parameters with changeover times for workdays and the weekend are stored there, depending on the tariff zones. Using the tariff model zone read out from the first memory area S1, depending on time parameters such as the time of day and the day of the week, a parameter set is read out from the second memory area S2 and, using this parameter set, the user charge is calculated in the control unit ST. The control unit ST may also be provided on the chip card SIM. This is then indicated, if necessary, on the display unit A.

If, for example, as shown in FIG 4, the dialled number is 0043-1234567, the tariff data allocated to Zone 2 is calculated depending on the prefix number 0043 and the location parameter 49, corresponding to the prefix for Germany. It is assumed here that the mobile station MS has registered with a switching system VSS in Germany and the data of these mobile stations is stored in the corresponding visitor location register VLR. Using Zone 2, the

parameter set 7 is selected from the second memory area as charge data P if the call is made between 6 AM and 8 PM on a workday.

The corresponding user charges can then be displayed continuously on the display unit A. The control unit ST may also contain a further memory device S3, in which the user charges of a plurality of calls or the charge total covering several calls can be stored. The subscriber-specific charge information may be loaded by the service provider onto the chip card SIM. If the tariff model changes, the service provider can exchange the chip card SIM or transmit specially coded short messages relating to the mobile radio network to this subscriber. Short messages of this type are generally known by the name of Short Message Service. Using these short messages, the information in the memory area SP can be modified or stored again. The short messages contain a special message header which the mobile station recognises as a message to modify or store the new tariff model.

The time parameters, i.e. the time and date, may either be entered directly on the mobile station by means of the keypad T into a storage unit S4 of the control unit ST, or by means of other time/date sources. The time/date information on a signalling channel on the air interface between the mobile station MS and the base station BSS may serve as a source of this type, or these time parameters may also be sent by an "SMS Cell Broadcast Service" to the mobile station MS. The advantage is that the subscriber, when located in a different country, does not need to worry about the current national time, since the mobile station MS is automatically synchronised with the local time.

The running charge total may be held on the chip card SIM in a storage space which cannot be erased by the customer. Erasure may then be carried out, for example, only by the lessor of a mobile station MS. An inquiry, on the other hand, may be made by both the lessor and the subscriber. The inquiry may be made either by means of a chip card reading device KL or by means of the transmission of a special short message to the subscriber, whereupon the mobile station MS in turn sends back a short message with the charge total to the lessor and, if necessary, erases the charge total on the chip card SIM.

Claims

1.   Method for calculating the user charge in a subscriber device (MS), which is connected to a mobile radio network (GSM) and which contains a control unit (ST) and a storage device (SP), in which charge data (P) transmitted from a switching sub-system (SSS) is stored,
        characterised in that
        tariff data (Z) allocated to the subscriber, which is read out using the dialled number of a remote subscriber and using location data allocated to the subscriber device (MS) is stored in the storage device (SP) in a first memory area (S1), and the charge data (P) transmitted from the switching sub-system (SSS) is stored in a second memory area (S2), and the user charge is calculated by means of the control unit (ST), using the tariff data (Z) and the corresponding charge data (P).

2.   Method according to claim 1,
        characterised in that
        a storage device which can be removed from the subscriber device (MS) is used as the storage device (SP).
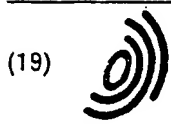
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3. Method according to claim 2,
characterised in that
a chip card (SIM) is used as the storage device (SP).

4. Method according to one of claims 1 to 3,
characterised in that
the user charge can be totalled over a longer period and is stored.

5. Method according to claim 4,
characterised in that
the user charge is stored in erasable form.

6. Method according to one of claims 1 to 5,
characterised in that
the user charge is displayed on a display unit (A) of the subscriber device (MS).

7. Method according to one of claims 1 to 6,
characterised in that
the user charge can be transmitted via the mobile radio network (GSM).

8. Method according to one of claims 1 to 7,
characterised in that
the user charge is transmitted following reception of a request to the subscriber device
(MS) via the mobile radio network (GSM).

9. Method according to claim 7 or 8,
characterised in that
that the user charge is transmitted by means of the short message service (SMS)
known in a mobile radio system (GSM) known per se.

10. Method according to one of claims 1 to 9,
characterised in that
the charge data (P) is transmitted according to the e-parameter set customary in a
mobile radio network (GSM) known per se.

11. Method according to one of claims 1 to 10,
characterised in that
time parameters and/or location parameters are stored and processed by means of the
control unit (ST).

12. Arrangement for calculating the user charge in a subscriber device which is connected
to a mobile radio network (GSM) and which contains a control unit (ST) and a storage
device (SP) in which charge data (P) transmitted from a switching sub-system (SSS)
can be stored,
characterised in that
the storage device (SP) contains a first memory area (S1), in which tariff data (Z)
allocated to the subscriber can be stored, which can be read out using the dialled
number of a remote subscriber and using location data allocated to the subscriber

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device (MS), and a second memory area (S2), in which the charge data (P) transmitted from the switching sub-system (SSS) can be stored, and the control unit (ST) calculates the user charge from the tariff data (Z) and the corresponding charge data (P).

13.   Subscriber device which is connected to a mobile radio network (GSM) and which contains a control unit (ST) to calculate the user charge and a storage device (SP), in which charge data (P) transmitted from a switching sub-system (SSS) can be stored,
characterised in that
the storage device (SP) contains a first memory area (S1), in which tariff data (Z) allocated to the subscriber can be stored, which can be read out using the dialled number of a remote subscriber and using location data allocated to the subscriber device (MS), and a second memory area (S2), in which the charge data (P) transmitted from the switching sub-system (SSS) can be stored, and the control unit (ST) calculates the user charge from the tariff data (Z) and the corresponding charge data (P).

14.   Subscriber device according to claim 13,
characterised in that
it is designed as a mobile station.

Key to Figures (alphabetical):

Allgemeines Tarifmodell	General tariff model
Aufenthalt	Location
Berechnen	Calculation
Billigtarif	Reduced tariff
Dienste	Services
e-Parameter	e-parameters
gewaehlte Nummer	Dialled number
Laden der Parameter	Loading of parameters
Normaltarif	Normal tariff
P-Satz	P-set
Taginformation	Day information
Tarifzonenzuordnung	Tariff zone allocation
Werktags	Workdays
Wochenendtarif	Weekend tariff
Ziel	Destination
Zone	Zone

(54) **Verfahren und Anordnung zum Ermitteln der Benutzergebühr in einer Teilnehmereinrichtung**

(57) Zum Ermitteln der Benutzergebühr in einer Teilnehmereinrichtung, die mit einem Telekommunikationsnetz verbunden ist und die eine Steuereinheit (ST) und eine Speichereinrichtung (SP) enthält und zu der von einer Zentralstelle (SSS) Gebührendaten (P) übertragen werden, werden in der Speichereinrichtung (SP) dem Teilnehmer zugeordnete Tarifdaten (Z) und die von der Zentralstelle (SSS) übertragenen Gebührendaten (P) eingespeichert. Die Steuereinheit (ST) ermittelt aus Tarifdaten (Z), die unter Verwendung der gewählten Nummer eines fernen Teilnehmers aus der Speichereinrichtung (SP) auslesbar sind und aus entsprechenden Gebührendaten (P) die Benutzergebühr.
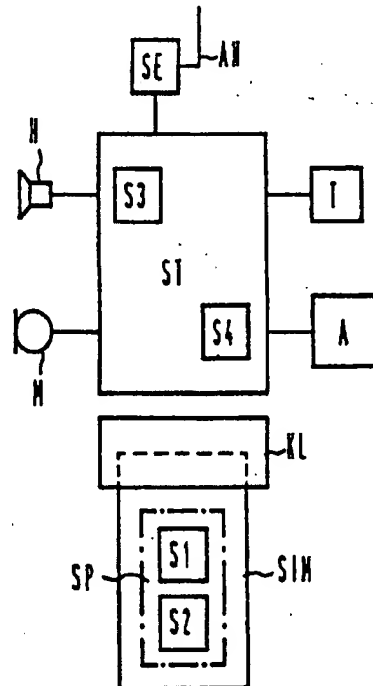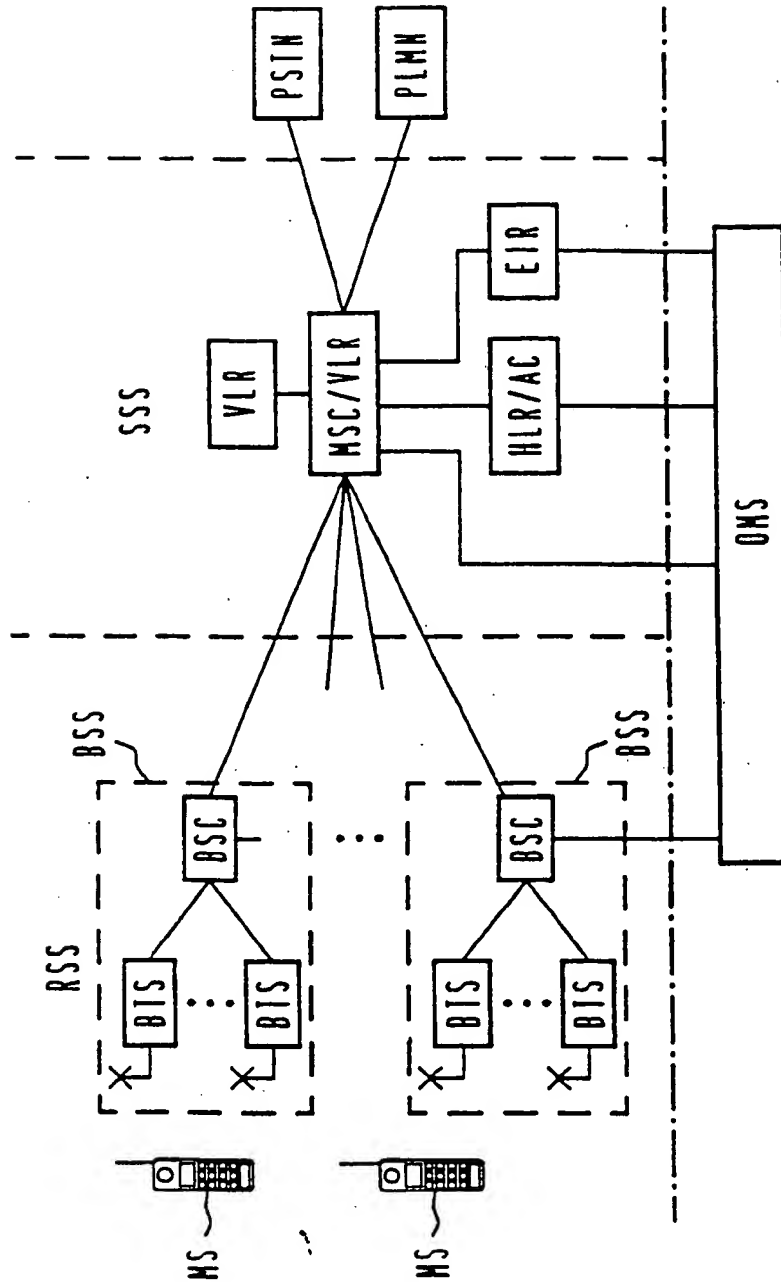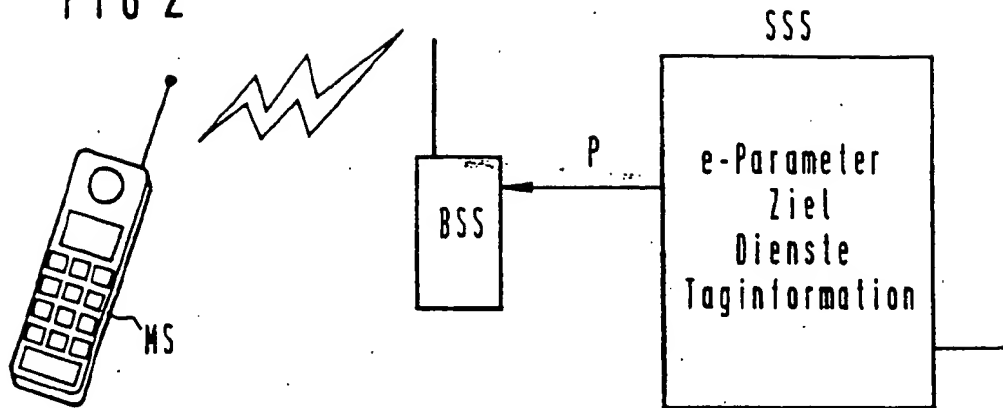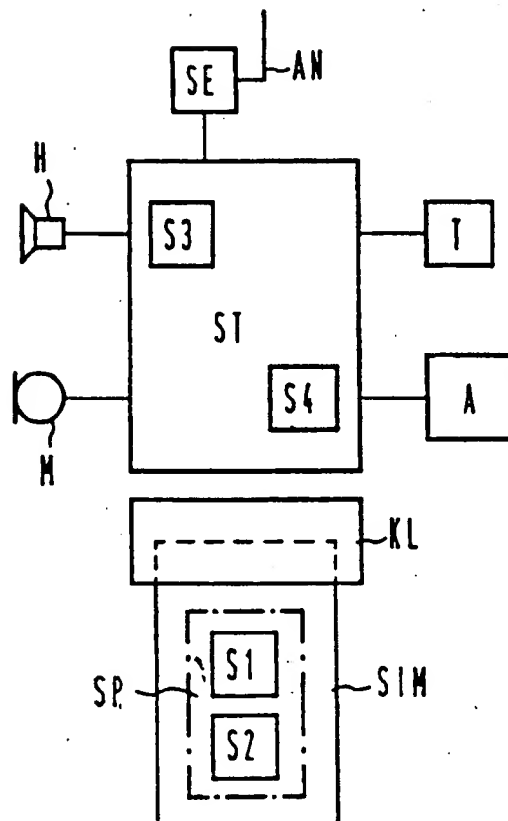
FIG 3

FIG 1

FIG 2

SSS

P

BSS

e-Parameter
Ziel
Dienste
Taginformation

MS

FIG 3

SE ─ AN

H

S3

T

ST

S4

A

M

KL

SP

S1

SIM

S2

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FIG 4

allgemeines Tarifmodel

ZONE	Werktags		Wochen-end-tarif
	Normal tarif	Billig tarif	
0	P-Satz 1 8:00->20:00	P-Satz 2 20:00->8:00	P-Satz 3 0:00->24:00
1	P-Satz 4 8:00->20:00	P-Satz 5 20:00->8:00	P-Satz 6 0:00->24:00
2	P-Satz 7 8:00->20:00	P-Satz 8 20:00->8:00	P-Satz 9 0:00->24:00

S1

Berechnen

SIM

P

Tarifzonenzuordnung

S2

	49	43	--
0172-	0		--
0xxx-	1		
0043-			
001-	8		

gewaehlte Nummer
0043-1234567

Z

Z

Laden der Parameter

Aufenthalt